CLAIMS

1. An adjustment member for mounting on an armature shaft, comprising:

a first member dimensioned to be received on the armature shaft and be received in a second member in order to adjust an end play distance.

2. The adjustment member as recited in claim 1 wherein said tube is dimensioned to slide on an outer diameter of said first member while staying in substantially the same position on said armature shaft.

3. The adjustment member as recited in claim 1 wherein said first member comprises a tube that slides over the shaft with a slip fit.

4. The adjustment member as recited in claim 1 wherein said first member comprises a tube that slides over said armature shaft with less force than is required to slide said first member into said second member.

5. The adjustment member as recited in claim 3 wherein said tube is cylindrical.

6. The adjustment member as recited in claim 3 wherein said tube comprises multiple sides.

7. The adjustment member as recited in claim 1 wherein said second member comprises an end lamina tube comprising a plurality of slots to facilitate receiving said first member therein.

8. The adjustment member as recited in claim 1 wherein said second member comprises no slots to facilitate receiving said first member therein.

9. The adjustment member as recited in claim 1 wherein said second member is a polymer and is welded onto said adjustment member.

10. The adjustment member as recited in claim 1 wherein said second member is a polymer and is laser welded onto said adjustment member.

11. The adjustment member as recited in claim 1 wherein said second member is a polymer and is affixed to said adjustment member with an adhesive.

12. The adjustment member as recited in claim 1 wherein said second member and said adjustment member are both polymers.

13. The adjustment member as recited in claim 1 wherein said second member and said adjustment member are both metallic.

14. The adjustment member as recited in claim 1 wherein one of said second member or said adjustment member is metallic and the other is a polymer.

15. The adjustment member as recited in claim 1 wherein said end play distance is less than 0.15 inches.

16. The adjustment member as recited in claim 4 wherein said end play distance is less than one inch.

17. The adjustment member as recited in claim 1 wherein said first member comprises a cylindrical tube and said second member comprises a lamina tube.

18. An electric motor comprising:

a motor housing for receiving a stator operatively associated with a rotor comprising a lamina stack comprising an end-lamina tube, said lamina stack being in operative relationship with said stator;

an armature shaft; and

an adjustment member dimensioned to be received on the armature shaft and be received in an end lamina tube assembly, said adjustment tube being slidable on said armature in order to adjust an end play distance.

19. The electric motor as recited in claim 18 wherein said adjustment member is dimensioned to slide in an inner diameter of said end lamina tube assembly while staying in substantially the same position on said armature shaft.

20. The electric motor as recited in claim 19 wherein said at least one of said adjustment member, said end lamina tube or said armature shaft comprise at least one raised area to facilitate holding said adjustment member in a desired position.

21. The electric motor as recited in claim 18 wherein said adjustment member slides onto the armature shaft with a slip fit.

22. The electric motor as recited in claim 18 wherein said adjustment member slides over said armature shaft with less force than is required to slide said adjustment member into said end lamina tube.

23. The electric motor as recited in claim 18 wherein said end lamina tube assembly comprises a plurality of slots to facilitate receiving said adjustment member therein.

24. The electric motor as recited in claim 18 wherein said end lamina tube assembly comprises no slots to facilitate receiving said adjustment member therein.

25. The electric motor as recited in claim 18, wherein either said end lamina tube assembly or said adjustment member comprises a plurality of fingers.

26. The electric motor as recited in claim 18, wherein both of said end lamina tube assembly and said adjustment member are continuous tubes.

27. The electric motor as recited in claim 18 wherein said adjustment member is a polymer and is welded onto said end lamina tube assembly.

28. The electric motor as recited in claim 27 wherein said adjustment member is ultrasonically or laser welded onto said end lamina tube assembly

29. The electric motor as recited in claim 18 wherein said end lamina tube is a polymer and is affixed to said adjustment member with an adhesive.

30. The electric motor as recited in claim 18 wherein said end lamina tube and said adjustment member are both polymers.

31. The electric motor as recited in claim 18 wherein said end lamina tube and said adjustment member are both metallic.

32. The adjustment member as recited in claim 18 wherein one of said second member or said adjustment member is metallic and the other is a polymer.

33. The electric motor as recited in claim 18 wherein said end play distance is less than 0.5 inch.

34. The electric motor as recited in claim 22 wherein said end play distance is less than 0.5 inch.

35. The electric motor as recited in claim 22 wherein said adjustment member is a tube.

36. The adjustment member as recited in claim 35 wherein said tube comprises multiple sides.

37. The adjustment member as recited in claim 35 wherein said tube is cylindrical.

38. The adjustment member as recited in claim 22 wherein said tube comprises multiple sides.

39. A method for controlling an end play distance in an electrical motor, said electric motor comprising a motor housing for receiving a stator operatively associated with a rotor mounted on an armature when the armature is received in the motor housing, said motor comprising a lamina stack and an end-lamina tube, said lamina stack being operatively related to said stator when said rotor is situated in said housing, said method comprising the steps of:

providing an adjustment member dimensioned to be received on the armature shaft and be received in said end lamina member;

slidably mounting said adjustment member onto said armature;

positioning the end lamina member onto said armature having said lamina stack until at least a portion of said adjustment member is received with said end lamina tube, thereby providing an armature assembly;

positioning the armature assembly in said motor housing;

situating an end cap on said motor housing until the bearing engages said adjustment member; and

securing said end lamina member onto said adjustment member.

40. The method as recited in claim 39 wherein said tube is dimensioned to permit said end lamina member to slide on an outer diameter of said adjustment member while staying in substantially the same position on said armature shaft.

41. The method as recited in claim 39 wherein said adjustment member slides onto said armature shaft with less force than is required to slide said adjustment member into said end lamina member.

42. The method as recited in claim 41 wherein said force required to slide is less than one pound.

43. The method as recited in claim 39 wherein said method further comprises the step of:

providing an end lamina member comprising a plurality of slots to facilitate receiving said adjustment member therein.

44. The method as recited in claim 39 wherein said method further comprises the step of:

providing an end lamina member that comprises no slots.

45. The method as recited in claim 39 wherein said method further comprises the step of:

providing an adjustment member having a plurality of fingers to permit gripping the end lamina member.

46. The method as recited in claim 39 wherein said method further comprises the step of:

providing an end lamina member comprising a plurality of fingers to facilitate gripping said adjustment member.

47. The method as recited in claim 39 wherein said adjustment member is a polymer and is welded onto said end lamina member.

48. The method as recited in claim 47 wherein said end lamina member is laser welded onto said tube assembly.

49. The method as recited in claim 39 wherein said end lamina tube is a polymer and is affixed to said adjustment member with an adhesive.

50. The method as recited in claim 39 wherein said end lamina member and said adjustment member are both polymers.

51. The method as recited in claim 39 wherein said end lamina member and said adjustment member are both metallic.

52. The adjustment member as recited in claim 39 wherein one of said second member or said adjustment member is metallic and the other is a polymer.

53. The method as recited in claim 39 wherein said end play distance is less than 0.5 inch.

54. The method as recited in claim 42 wherein said end play distance is less than 0.5 inch.

55. The method as recited in claim 39 wherein said method further comprises the step of:

moving said armature a desired amount until an end play distance reaches a desired end play distance before said securing step.

56. The method as recited in claim 39 wherein said desired end play distance is zero.

57. The method as recited in claim 42 wherein said end play distance is greater than zero but less than 0.5 inch.

58. The method as recited in claim 39 wherein said end lamina member and said adjustment member are both cylindrical tubular members.

59. The adjustment member as recited in claim 39 wherein said tube is cylindrical.

60. The adjustment member as recited in claim 39 wherein said tube comprises multiple sides.

61. The method as recited in claim 39 wherein said end lamina member is slotted.

62. The method as recited in claim 39 wherein said adjustment member is cylindrical.

63. The method as recited in claim 39 wherein said securing step is accomplished by stacking, magnetic forming or screwing said end lamina member onto said adjustment member.